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Marketing MOLASSES in the FEED-MIXING INDUSTRY

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CONTENTS

	Page
Summary	3
Background	5
Mixed-feeds industry as an outlet for molasses	6
Molasses used in mixed feeds	9
Dried molasses products in the mixed-feeds industry	14
Competitive position of molasses as an ingredient in mixed feeds	17
Sugar in mixed feeds	19

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SUMMARY

Livestock feed has supplanted fermentation alcohol as the primary market outlet for molasses since World War II.

The use of molasses for feed mixing in the years 1951, 1952, and 1953 was evaluated from a survey of 227 firms that produced almost 28 percent of the total mixed feed reported by the industry. However, any summation of molasses in mixed feeds requires measurements at several stages in the feed marketing process. The mixed feed or mixing concentrate produced by one mill becomes a mixing ingredient at another mill. The product of the latter mill may be combined with other grain or with hay by feed mixers on the farm. Molasses can be added at any step in the process.

Firms surveyed showed a close limitation of molasses storage capacity. Turnover of their molasses stock averaged more than seven times per year. Usually, purchases of molasses for later delivery by larger users reach a seasonal low during the peak period of production. The bulk of this production is in Cuba and other offshore areas. This, plus limitation of their storage capacity, prevents feed mixers from taking full advantage of seasonal shifts in molasses prices to buy in large volume from raw sugar mills in the production season. Producers, too, have restricted storage capacity. Between production seasons molasses is stored by the primary distributors. They buy the major portion of the molasses during producing seasons, when prices are seasonally low, store it, and later sell and distribute it.

Mills surveyed were divided into two categories: firms with 1 or 2 plants and firms with 3 or more plants. The mills were grouped into 4 geographic areas.

The 2 categories of mills showed differences in extent of using molasses and in practices of mixing molasses with feed. The 210 firms with 1 or 2 plants, reporting on a total of 1,693,697 tons of mixed feed, used molasses equal in quantity to 6.1 percent of total feed mixed. The 17 multiple-plant firms (that is, firms with 3 or more plants), reporting on a total of 7,702,603 tons of feed mixed, used molasses equal to 3.5 percent of total feed mixed. The 1- or 2-plant firms showed a slightly greater rate of increase in total molasses used during 1951-53, 22 percent, compared with a 20-percent increase for multiple-plant firms.

The relative volumes of feed mixed for different kinds of livestock are believed to account for much of these differences in rates of use and in the increase in use. Poultry feed manufacture was found to be concentrated among larger firms and among the multiple-plant firms. Cattle, hog, and sheep feeds were the principal kinds mixed by the smaller, mostly the 1- or 2-plant, firms.

The level of use and frequency of use of molasses were reported to be very much higher in cattle feeds than in feeds for any other kind of livestock.

Opportunity to market molasses in mixed feed depends to a large degree on the price relationship between molasses and other carbohydrates. At 1953 levels of use in mixed feeds, prices of molasses can be about equal to the prices of competing carbohydrates without substantial loss in the demand of feed mixers for it. Roughly three-fourths of the firms surveyed asserted they would reduce purchases of molasses if prices exceeded those of competing carbohydrates. Some of the remaining firms indicated a willingness to continue molasses purchases at prices as much as 76 percent above those for equivalent competing carbohydrates. Their level of usage, however, was only slightly above that considered essential for other attributes, such as binding, dust settling, and palatability.

Values other than carbohydrate value are important to the use of molasses in feed. Among these values users ranked improved feed palatability first, binding and dust settling of fine-particled feeds second, and improved appearance and feel of feed third. Other values suggested included (1) improved overall feed digestibility, (2) mild laxative effect, (3) improved appearance of animals, (4) improved pelleting of feed, and (5) aid in stabilization of the mixture, keeping fine particles of antibiotic, vitamin, and mineral mixtures evenly distributed.

Another type of product making use of molasses is one with molasses dried on suitable absorptive carriers. Such products now constitute a minor but important market for molasses in feed. Their use in 1953 was almost double that in 1952 and equaled 5.1 percent of total feed use. These products find a market where mixers and livestock feeders lack facilities for using liquid molasses or where demand is low for molasses-containing feeds. The relative cost of carbohydrates in dried molasses products was higher than alternative carbohydrates in every surveyed mill where they were used. Feed mixers who had had experience with it commented most on this point. Also, some feed mixers using liquid molasses at the time of this survey reported that sugar would be cheaper, on the basis of carbohydrate content, than dried molasses products from available sources.

Possibilities for utilization of raw sugar as an alternative for dried molasses in feed have been of considerable interest since World War II. Sugar would contribute carbohydrates in concentrated, readily assimilable form, but without the moisture, odor, and laxative effect of molasses. The delivered cost of raw sugar bought at world market prices was about twice the cost of the sugar in molasses delivered to the feed-mixing centers of the United States in 1954. In 1955, the first year of its significant use in feed, 18,990 tons, raw value (equal to approximately 6.5 million gallons of molasses of 50 percent sugar content) were imported for feed use.

MARKETING MOLASSES IN THE FEED-MIXING INDUSTRY

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BACKGROUND

This report is the third in a series devoted to economic evaluation of the marketing of molasses to the livestock feeding industry. The first dealt with economic aspects of using molasses by livestock raisers; the second report dealt with the modes of transportation for bulk molasses and the advantages of each mode between seaport terminals, feed-mixing centers, and inland livestock feeding areas.

This third report gives the results of a survey of the mixed-feeds industry as a market for industrial molasses. 1/ It evaluates (1) molasses in mixed feeds in competition with other carbohydrates and (2) the special attributes of molasses in mixed feeds, such as a binder, dust settler, and appetizer.

Historically, the major outlet for molasses has been industrial alcohol. Considerable quantities are still used for this purpose, but competition of synthetic alcohol has reduced this market outlet for molasses from 74 percent of total molasses utilized in 1944 to 45 percent in 1947 and 17 percent in 1954.

The information given in this report was obtained by surveying a sample of feed-mixing firms selected to represent regional and national characteristics of the feed-mixing industry. The sample was constructed in two parts. One part comprised 17 of the 18 multiple-branch firms listed by Feedstuffs magazine in its directory of feed mills in the United States and Canada. Multiple-branch firms are those with 3 or more plants. The second part, from the same source, comprised a random sample of firms with 1 or 2 plants within selected States of each region. Over 7,000 1- or 2-plant firms were listed, of which 5,324 are estimated to have been manufacturing feed when the survey was made in 1953. 2/ The map on page 20 shows the area covered and the density of establishments

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1/ Industrial molasses or molasses, as used in this text, refers to the four byproducts: Blackstrap and high-test molasses from the cane sugar industry, beet molasses from the beet sugar industry, hydrol from the wet corn milling industry, and citrus molasses from the citrus fruit processing industry.

2/ The country was divided into 4 regions: (1) Northeast and New England, (2) Southeast and Gulf, (3) Midwest and Plains, and (4) West and Southwest. The mills in the sample were selected as follows: Region 1--every 12th mill in New York and Pennsylvania. Region 2--every 12th mill in Tennessee, Kentucky, Georgia, Florida, Alabama, Louisiana, Virginia, and Maryland. Region 3--every 36th mill in Missouri, Minnesota, Iowa, and Indiana. Region 4--every 12th mill in Texas, Oklahoma, Colorado, and California. The larger number of listings of mills in region 3 permitted the lower rate of sampling.

in the sample. The States within each of the four regions were selected for sampling of 1- and 2-plant firms on the basis of criteria that would typify conditions affecting use of molasses in each region. These criteria included distance from, and type of, molasses source, availability of other carbohydrate feeds, nature of molasses distribution facilities, and types of livestock feeding programs.

MIXED-FEEDS INDUSTRY AS AN OUTLET FOR MOLASSES

One of the basic problems in describing and analyzing the market for molasses in mixed feeds is determination of the nature and extent of the market itself. Statistics of the industry are not adequate for this purpose on (1) the total volume of mixed feed, (2) the volume produced in each area, (3) the types of feed produced, and (4) the variations in ingredients of different types of feeds.

In 1947, the latest year for which Census of Manufactures data are available on use of molasses in mixed feeds, 528,000 tons, or an estimated 90.3 million gallons, of molasses was reported used in mixed feeds. 3/ In the same year 26 percent of the mixed feeds, or approximately 5.7 million tons, was beef and dairy animal feeds. If all the molasses used by the industry members surveyed by the Census of Manufactures for 1947 went into these types of feed, the average rate of use was equal to 9.2 percent of the beef and dairy feed mixtures. Other types of mixed feeds for which molasses is considered suitable, including those for goats, horses, mules, and pets, made up an additional 2.1 million tons of feed. If molasses was included in these feeds in addition to beef and dairy feeds, the rate of use equaled 6.7 percent of the total volume of mixed feed for all livestock other than poultry 4/ (table 1).

3/ Estimated on basis of 171 gallons equals 1 ton.

4/ Using molasses in poultry feeds has not been considered a good practice. Recent studies of its use in chick feeds by M. M. Rosenberg, as published in "Response of Chicks to Graded Concentrations of Cane Final Molasses," Poultry Science, 34(1), Jan. 1955, indicate that molasses in chick feeds can be well tolerated up to 23 percent of total ration and perhaps even to 34.5 percent of total ration if the feed is freshly mixed and the scouring effects of molasses at this concentration can be tolerated. At the time of this study, January 1954, only 37 plants were using molasses in poultry feed although the price of molasses was the lowest in recent years. Reasons given for not using it were that mixing molasses into the feed is an extra step in processing and that the use of 2 to 3 percent, then considered the maximum, was not worth the extra cost. Poultry feeders did not care whether feed contained molasses or not. Representatives of multiple-plant firms (3 or more plants) and of the 1- or 2-plant firms in the poultry areas of California and in the Del-Mar-Va area of Delaware, Maryland, and Virginia all held substantially this view with regard to poultry feed use.

Table 1.--Molasses used in livestock feed, 1947-54

Year	Molasses used for feed 1/	Production of mixed feeds for dairy cattle, swine, beef, and sheep 2/	Feed molasses as percentage of mixed feeds for dairy cattle, swine, beef and sheep	Production of all mixed feeds 2/	Feed molasses as percentage of total mixed feeds
	Tons	Tons	Percent	Million tons	Percent
1947...	747,953	11,570,000	6.46	26.0	2.87
1948...	1,313,450	9,384,000	14.00	25.5	5.15
1949...	1,173,099	9,177,000	12.78	28.5	4.12
1950...	1,363,742	9,486,600	14.38	29.1	4.78
1951...	1,454,385	10,824,000	13.44	32.8	4.43
1952...	1,756,725	12,624,800	13.91	34.4	5.11
1953...	2,069,590	11,592,800	17.85	33.7	6.14
1954...	2,228,070	11,865,000	18.78	35.0	6.37

1/ Walker, Gaylord. Industrial Molasses--An Annual Market Review. U. S. Agr. Mktg. Serv. Nov. 1954.
2/ American Feed Manufacturers Association.

Statistics on the total utilization of molasses are published by the Agricultural Marketing Service in its annual reports on production of molasses and mixed feeds. Data on the components of molasses are compiled by the American Feed Manufacturers Association. For several reasons, these statistics are not sufficient for evaluating the use of molasses in feeds: (1) A large part of the total feed mix included in the statistics of the association represents feed-mixing concentrates, prepared and sold as ingredients for further feed mixing. Many small-volume feed-mixing firms and farm or feed-lot operators who have mixing equipment use these concentrates in proportions ranging from 1/10 to 1/3 of the final mixed feed. (2) Many of the feed-mixing firms surveyed usually omitted feed mixing done on a custom basis with the customer's materials from the totals they reported to the American Feed Manufacturers Association. The significance of this is suggested by the situation in Wisconsin, where the 1- or 2-plant firms sampled did 85 percent of their total feed mixing on a custom basis. All 1- or 2-plant firms in the survey averaged 40 percent of total business on a custom basis.

These considerations indicate that any measurement of total mixed feeds must include measurements of volume at several stages in the marketing process. Also, because of the high incidence of farm-owned feed-mixing equipment, the volume mixed by farmers must be included. Molasses is mixed into feeds at all stages of marketing. Interviews in the feed industry and among molasses distributors and livestock raisers indicate a shift to use of mixed feed containing molasses, replacing direct feeding of molasses or sprinkling molasses on feeds. However, this shift is not indicated by the statistics on production of mixed feeds shown in table 1.

Seventeen of the eighteen multiple-plant firms in the United States were included. These firms reported on 120 establishments. Estimates based on data from the Census of Manufactures show that multiple-plant firms handled 35 percent of the mixed-feed business in 1947. The survey here reported showed a smaller portion of the business in the hands of multiple-plant firms in 1953. In the latter year all mills surveyed reported a combined production of 9,396,300 tons of feed. This was approximately 28 percent of the total of 33,700,000 tons for the industry reported by the American Feed Manufacturers Association. Only 23 percent of this 33,700,000 tons was reported by our survey of 17 multiple-plant firms.

The 210 firms with 1 or 2 plants were picked at random to represent the estimated 5,324 firms in that class that were actually manufacturing feeds in 1953.

The average production of the 5,324 firms in the group was smaller than the average for the 210 firms surveyed. Those surveyed used 372,710 tons of molasses in 1953, or 18 percent of the 2,069,590 tons available for feed. This rate of molasses consumption, when expanded to cover total feed production, indicates feed mills used about 65 percent of the available molasses supply, leaving 35 percent for on-the-farm feeders, for dried molasses feed products, and for combining with beet pulp and citrus meal.

In view of the fact that 17 multiple-plant firms reported 23 percent of the business, 25 percent was assigned to represent all 18 mills in the class, with 75 percent assigned to 1- or 2-plant firms (table 2).

Table 2.--Volume of feeds mixed by surveyed firms, by type of firm and by region, 1953

Region	1- or 2-plant firms	Multiple-plant firms	All firms
	Tons	Tons	Tons
1. Northeast	285,100	823,596	1,108,696
2. Southeast	504,396	1,064,917	1,569,313
3. Midwest and Plains	184,374	4,472,628	4,657,002
4. West and Southwest	719,827	1,341,462	2,061,289
Total	1,693,697	7,702,603	9,396,300

This mixed-feed volume represents gross tonnage of feed materials passing through individual mills. Tonnage figures overlap, since the product of one firm may become a mixing ingredient for another firm. Many of the 1- or 2-plant firms depended entirely on the products of other firms for their mixing concentrates to combine with locally produced grains or hay. The ratios of

combination and expansion of mixing concentrates into total mixed feeds could be as high as 10 to 1 if the practices found in some of the smaller plants were widely used.

The use of molasses going into mixed feeds followed a similar practice. A mixed feed containing molasses from one manufacturer could be combined with additional grain, hay, or other ingredients plus more molasses at another mill or by a livestock feeder, or even at both places. These statistical relationships between sample data and total mixed feed business indicate the complexity of the problem of measuring the total mixed feed business.

MOLASSES USED IN MIXED FEEDS

The reports from the survey indicate that in 1953 the 1- or 2-plant firms as a group used a larger proportion of molasses in their feeds than did multiple-plant firms (table 3).

Table 3.--Proportion of molasses used in mixed feeds, by type of firm and by region, 1953 1/

Region	1- or 2-plant firms	Multiple-plant firms
	Percent	Percent
1. Northeast	6.5	4.0
2. Southeast	7.2	3.4
3. Midwest and Plains	11.3	3.5
4. West and Southwest	3.7	3.3
Average	6.1	3.5

1/ The data on use of molasses for feed-mixing are presented by regional averages of all 1- or 2-plant firms and by averages of all firms with 3 or more plants. Where a multiple-plant firm had branches in more than one region, the regional averages are based on that firm's establishments within the region and the average was obtained as if these establishments in the region constituted a single multiple-branch firm.

The relative volume of feed mixed for different kinds of livestock in the two classes of mills may account for a considerable part of this difference in proportions of molasses used. Poultry feed manufacture was found to be centered in the large establishments (chiefly the multiple-plant firms). Cattle, swine, and sheep feeds were the principal ones made by the smaller and single-establishment firms, particularly those with a large proportion of total feed mixing on a custom basis.

Expansion of tonnage of molasses used from 1951 to 1953, was 20 percent for multiple-plant firms and 22 percent for 1- or 2-plant firms (table 4).

Table 4.--Molasses use, by type of firm and by region, 1951-53

Region	1- or 2-plant firms			Multiple-plant firms		
	1953	1952	1951	1953	1952	1951
	Tons	Tons	Tons	Tons	Tons	Tons
1. Northeast....	18,788	18,556	17,927	33,227	31,787	26,461
2. Southeast....	36,504	29,914	27,913	36,109	38,823	32,951
3. Midwest and Plains.....	20,971	22,515	19,647	156,009	151,429	124,093
4. West and Southwest..	27,210	20,708	19,270	43,892	46,528	40,234
Total.....	103,473	91,693	84,757	269,237	268,567	223,739

This represented 64,200 tons for surveyed firms and 323,500 tons for the industry. Of this total growth, 278,000 tons, or more than 85 percent, was used by the 1- or 2-plant firms surveyed, whereas 45,500 tons of the increase were used by the 17 multiple-plant firms. This relationship shows the importance of the small feed mixer in expanding the market for molasses in mixed feeds.

Molasses storage capacity of the two groups, relative to their annual rates of consumption in 1953, differed in some regions; but nationally the turnover rates were about equal (table 5).

Table 5.--Storage capacities and annual turnover rates for molasses in feed mills visited, by type of firm and by region, 1953

Region	1- or 2-plant firms		Multiple-plant firms	
	Storage capacity	Turnover	Storage capacity	Turnover
	Gallons	Number	Gallons	Number
1. Northeast....	548,054	5.9	637,618	10.5
2. Southeast....	697,645	8.9	991,124	6.2
3. Midwest and Plains.....	507,250	7.1	4,614,924	5.8
4. West and Southwest..	560,362	8.3	1,299,034	5.8
Total or average....	2,313,311	7.8	7,542,700	7.1

These figures indicate that the feed industry does not have molasses storage capacity for more than 2 months' average requirements. Also, molasses producers, as a group, do not have sufficient storage to hold their total molasses production in a crop year; some molasses must be moved into marketing channels during the producing season. Conditions brought about by this storage situation can cause producers' returns to be out of line with prices paid by consumers, after allowance is made for storage costs and for interest on capital invested in inventories.

Prices to producers tend to be low during the season when they sell, because they cannot store their annual production and consumers cannot take molasses in volumes sufficient to absorb the seasonal surge in supplies. Primary distributors buy molasses in large volumes at this time, store it, and distribute it later as consumers are able to use it.

Methods of bulk delivery of molasses to feed mills included rail tank car and tank truck, with some barrel deliveries reported by rail. Forty-nine percent of all firms reported tank-truck deliveries; 23 percent reported deliveries by tank car; 23 percent reported both tank-truck and tank-car deliveries; and 5 percent had delivery made in barrels. Tank-truck deliveries were reported most frequently by the 1- or 2-plant firms. Of the 145 firms with 1 or 2 plants that reported bulk receipts of molasses, 122 (69 percent) indicated that they used tank-truck delivery exclusively.

These percentages indicate the importance of tank-truck delivery. In 10 of the 19 States where individual establishments were surveyed, the average storage capacities reported for firms with 1 or 2 mills were below 12,000 gallons. The smaller feed mills, whose storage capacities and rates of using are too low for deliveries of full tank cars of molasses, make tank-truck delivery a prerequisite to molasses use by a large part of the feed-mixing industry.

All firms were asked to report their average and maximum levels of liquid molasses use in four main categories of livestock feeds. Wide differences appeared, as shown in table 6.

Molasses prices to the feed mixer can approach the prices of competitive carbohydrates before the demand for molasses by feed mixers will be affected. Each firm was asked to indicate at what point, in the price relationship between molasses and other carbohydrates, purchases of molasses would be reduced. Among multiple-plant firms, 16 said that when the price of molasses reached a point 10 to 25 percent (average, 19 percent) below other carbohydrates, they would cut back their use of molasses in feeds. (All plants of one firm in a region was considered as a single firm.) Thirteen firms said they would not reduce purchases until molasses became equal to, or slightly more costly than, other carbohydrates, 4 firms said that they would not substitute other carbohydrates for molasses until the price of molasses was well above the other feed ingredients. The average level of cutback in molasses use, indicated by these 4 firms, was 38 percent above the prices for other carbohydrates.

Table 6.--Molasses used per ton of mixed feeds, by type of feed and type of firm and by region, 1953

Dairy feeds

Region	Firms using molasses	1- or 2-plant firms		Multiple-plant firms	
		Average quantity used	Average of maximum quantities used	Average quantity used	Average of maximum quantities used
	Number	Pounds	Pounds	Pounds	Pounds
1. Northeast	47	199	283	200	330
2. Southeast	52	240	383	227	370
3. Midwest and Plains	18	251	305	199	336
4. West and Southwest	31	229	332	206	321
Total or average	148	226	330	206	338
Hog feeds					
1. Northeast	15	86	110	40	90
2. Southeast	17	129	161	60	110
3. Midwest and Plains	10	76	82	83	171
4. West and Southwest	9	129	142	99	140
Total or average	51	106	127	79	128
Poultry feeds					
1. Northeast	17	49	67	20	48
2. Southeast	9	101	179	27	65
3 Midwest and Plains	5	74	74	23	41
4. West and Southwest	6	73	93	50	71
Total or average	37	72	98	37	68
Beef cattle feeds					
1. Northeast	26	200	263	200	415
2. Southeast	47	279	392	220	390
3. Midwest and Plains	11	259	518	199	443
4. West and Southwest	23	207	292	170	274
Total or average	107	242	352	193	393

Estimates of the reactions of 1- or 2-plant firms to a change in price of molasses relative to prices of other carbohydrates, showed even more emphatically the strength of demand for molasses.

When asked, "Considering molasses only for its carbohydrate value, at what relative price would you discontinue molasses use in favor of other carbohydrate source ingredients?" the answers were as shown in table 7.

Table 7.--Molasses price and use policies of 1- or 2-plant firms, by regions, 1953

Region	Discontinue at price below equality with other carbohydrates		Discontinue at price equal to other carbohydrates	Discontinue at price above equality with other carbohydrates	
	Firms	Average below equality 1/	Firms	Firms	Average above equality 1/
	Number	Percent	Number	Number	Percent
1. Northeast...	4	15	31	13	18
2. Southeast...	9	22	31	11	53
3. Midwest and Plains....	7	16	--	12	55
4. West and Southwest.	26	28	67	52	76

1/ The average of individual firms' reports on the price differential percentages between molasses and alternative carbohydrate sources where a change in molasses buying practices would occur.

A frequent first answer to this question was, "I'll always use some molasses." After qualifying the question so as to include only the molasses above that necessary to give odor and taste and act as a binder, the answers more nearly reflected the competitive position of molasses as a carbohydrate. Many of those who placed a high value (25 percent or more above other sources of carbohydrates) on molasses were using it at, or only slightly above, the minimum quantity necessary to flavor the feed and act as a binder and dust settler. 5/

Rising levels of molasses prices relative to prices of other carbohydrates at the time of this writing (1956), if continued, will soon test the demand

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5/ The quantity of molasses required in feed to give these characteristics was variously estimated by feed mixers as being as low as 1 percent and as high as 6 percent. Most said 3 to 5 percent molasses in the final feed.

factors discussed previously. If the upward price trend continues, sales of molasses for feed mixing in many areas can be expected to shift sharply downward.

The carbohydrate value of molasses in a feed relative to other carbohydrates can be computed. 6/ Liquid molasses has additional value in mixed feeds that other carbohydrates do not have. (1) Most animals like the odor and taste that molasses gives to feed, and they consume less palatable feeds in greater quantity with a molasses admixture than without. (2) Molasses prevents sifting and blowing away of these feeds. (3) Molasses adds moisture and reduces incidence of choking and coughing by livestock on an otherwise dry and dusty feed. (4) Molasses improves the appearance and feel of feeds, giving them increased appeal to buyers.

Feed mixers were asked to rank these desirable characteristics of molasses in the order of their importance in feeds. Improved palatability was ranked first by over 60 percent of the respondents. The binding and dust settling characteristic was ranked second, and improvement in appearance and feel of the finished feed was ranked third by most of the respondents. Other values suggested by feed mixers included (1) improved digestibility of feeds, (2) mild laxative effect, (3) improved appearance of animals, (4) improved pelleting of feed, and (5) aid in stabilizing the feed mixture to keep fine particles of antibiotic, vitamin, and mineral mixtures evenly distributed throughout the mix while in storage or transit.

DRIED MOLASSES PRODUCTS IN THE MIXED-FEEDS INDUSTRY

The term "dried molasses products" refers to products made by drying molasses on an absorptive carrier. They are the result of efforts to obtain molasses products which can be shipped, stored, and mixed as dry and granular feed ingredients. The molasses content of such products is considerably higher than that of mixed feeds in which liquid molasses has been incorporated without drying either the molasses or the feed mixture.

Dried molasses products are made for feed uses similar to those for liquid molasses, but the dried products are intended as ingredients for further mixing. They are not made for direct feeding to livestock.

A survey was made in 1954 of all the known manufacturers of dried molasses products in the United States. At that time there were 17 manufacturers, 16 of whom were making and marketing a dried product and 1 who planned to begin operations in January 1955.

6/ Molasses has approximately 70 percent of the carbohydrate value of yellow corn. Thus, 100 pounds of corn equals approximately 143 pounds of molasses containing 48-52 percent sugars. On a volume basis a bushel of corn equals approximately 6½ gallons of (79.5 Brix or 42 Baume) molasses.

The history of the product, as indicated by the number of years some of the firms have been making it, extends back to the early 1930's; but one-half of the firms reporting had been in business 2 years or less. Eleven of the firms operating for all of 1953 reported use of 105,215 tons of molasses in dried and semidry products. 7/ In 1952, 8 of these same firms consumed 67,653 tons of molasses. In 1951, 69,948 tons of molasses was used by these 8 firms.

The feed value of dried molasses products on a per-pound basis is higher than liquid molasses as generally sold for livestock feed (79.5° Brix). The carbohydrate value of the carrier will increase the total carbohydrate value of the feed above that of the molasses. Total sugars content was 48 percent or more of the total product and ranged between 48 percent and 60 percent for the various products.

In dried molasses products the carrier approximately replaces the weight of the moisture content of liquid molasses, and the gain in feed value of the dried product is largely due to the added value derived from the carrier.

The various carriers used in making dried molasses products were brewers' grains, corn oil meal and corn gluten meal, grain bran and shorts, copra meal, citrus meal, ground corncobs, oat clippings, bran and hulls, and rice hulls and bran.

Each of these carriers contributes food value to the product in the form of protein, fat, and carbohydrates. Each is also a feed-mixing ingredient itself and has a market in its own right. The value added to both the molasses and the carrier by combining them is enough to pay the manufacturer of the dried molasses product, plus any added cost in marketing the new product.

Prices for dried molasses products, f.o.b. mill, at the time of survey averaged $72.68 per ton but ranged between $30 and $105 per ton. The carrier, the price of molasses at the point where it is used, and the demand for the product made by each manufacturer are determining factors in the difference in price. Where the carrier and the molasses were closely comparable in cost between firms, the f.o.b.-mill prices were close to each other. Ten of the sixteen firms had f.o.b. prices between $60 and $80 per ton.

Knowledge of the market for dried molasses products was also derived from the manufacturers and from subsequent visits to retailers, feed-mill operators, and brokers who handle the products of these manufacturers. The market was reported to be chiefly uses in which liquid molasses was not feasible. Some of the market uses named were silage making--liquid molasses would gum up blowers or leach out of high-moisture silage--and feed mills or farms where equipment for handling liquid molasses was not available.

7/ Semidry products include those in which a completely dry carrier is combined with high Brix molasses (above 82° Brix) and no moisture is extracted after mixing. The molasses content on a dry basis is the same as a dried product using the same carrier, but a moist feed-mixing ingredient designed for immediate use is the result.

When this survey was conducted, the overall marketing area for dried molasses products included the States from Montana eastward into New England, and from those States southward to a line extending from Oklahoma to Georgia.

Very few of the manufacturers of dried molasses products have an integrated marketing system for their products. Those that do, use an exclusive agent, broker, or feed retailer as their representative in each area. The majority of manufacturers reported their sales contacts to be limited to wholesalers and brokers. They had no regular contact with customers who use their products. Products are promoted through advertising in trade papers and leaflets in places where the dried molasses is sold.

Interviews with feed retailers and feed mills handling dried molasses products indicated that delivery of liquid molasses by tank truck had reduced sales of dried molasses products. Dried molasses could best compete for sales with liquid molasses where flies were a problem with liquid molasses, where the quantity of molasses wanted by the individual buyer was very small, or where farm feed mixing or silage making equipment could not handle liquid molasses. The higher price of dried molasses products in relation to liquid molasses and the increasing availability of liquid molasses delivered by tank truck were cited as the chief reasons for the great difference in use between dried molasses products and liquid molasses.

Dried molasses products were used by about one-fourth of the 1- or 2-plant firms visited in this study. Their rates of using these products were below those for liquid molasses. Because of the small number of firms reporting use of dried molasses, regional breakdowns were possible only for region 3. No use of these products was reported by the multiple-plant firms (table 8).

Users who mixed dried molasses products in feeds indicated that these products lacked some of the advantages of feeds mixed with liquid molasses. Molasses odor was considerably lessened in the dried product; binding and dust settling characteristics were lacking; and the point-of-sale advantages of appearance and feel of the feed imparted by liquid molasses were absent. Advantages of using dried products were given as: (1) Ability to get a higher concentration of molasses in the feed without special mixing equipment or obtaining a wet, sticky feed. (2) Ability to mix molasses-containing feeds in small batches for individual customers. This advantage was cited particularly by feed mixers principally occupied with making poultry feeds in which no molasses was used. (3) Advantages of storing and handling molasses ingredients without special equipment.

In each mill visited where a dried molasses product was used, the cost of carbohydrates from molasses in the dried product was higher than the cost of carbohydrates from other sources. In most instances the dried molasses product was used only in mixes specified by the customer. The higher costs of the molasses ingredient made such feeds more expensive on the basis of nutrients contained than if other carbohydrates had been used instead of the dried molasses concentrate.

Table 8.--Use of dried molasses products per ton of mixed feeds, by type of feed, by 1- or 2-plant firms, 1953

Region	Firms	Average quantity used	Average of maximum quantities used
	Number	Pounds	Pounds
Dairy feeds			
3. Midwest and Plains	31	106	122
Total or average (All regions)	49	121	147
Hog feeds			
3. Midwest and Plains	11	52	56
Total or average (All regions)	17	58	63
Poultry feeds			
3. Midwest and Plains	8	72	99
Total or average (All regions)	11	58	86
Beef cattle feeds			
3. Midwest and Plains	14	125	155
Total or average (All regions)	23	118	146

Wet and semidry molasses products were not studied in this survey. These products are principally from (1) the beet sugar processors who mix beet molasses with wet or dry beet pulp and (2) citrus processing plants that combine citrus molasses with the citrus pulp. These products can be used or fed directly without further mixing or dilution. Several of the farm users of liquid molasses in the northeast area considered the citrus molasses product excellent for lactating animals; these farmers used liquid blackstrap molasses only as a supplement to the citrus product or when unable to obtain adequate supplies of the citrus product. These pulp mixtures take a considerable portion of the citrus and beet molasses, making the liquid-use market a secondary outlet.

COMPETITIVE POSITION OF MOLASSES AS AN INGREDIENT IN MIXED FEEDS

Since World War II the market for molasses in the mixed-feeds industry has been greatly expanded. Firms that had never used it before have bought mixing equipment and made molasses a regular ingredient in their feeds. Livestock feeders became acquainted with it in feeds and asked for feeds containing it. As one dairy operator visited aptly expressed it, "It's getting so you can't buy cattle feed without molasses any more."

The survey of feed mills indicated that the only places molasses was not being used in feed mixing were those where its cost relative to other feed ingredients of like nutritive value made its use prohibitive. These were principally places with very small feed mills or areas where the cost of molasses was prohibitive because of distance from source or lack of rail unloading facilities or tank-truck transportation.

Although charges for transporting molasses to inland feed-mixing centers have been reduced significantly, the cost of molasses relative to other carbohydrates continues to be a primary factor retarding its use by all segments of the industry and in all areas of the country. 8/

Reports of feed mixers now using molasses indicate that price is an important factor in its continued use as a source of carbohydrates. The use of molasses at approximately 4 percent concentration in all mixed feeds, as a palatability factor and as a binder and dust settler, would provide a potential market for about 1,750 thousand tons. Deterrents to achieving this market would be the small quantities required by many of the potential users, entailing the more expensive methods of purchase in barrels or drums. Experience indicates that molasses in barrels or drums and at this higher price goes to a very limited market.

For extensive use in mixed feeds, molasses must be competitive with other carbohydrates on a delivered basis. Molasses usually requires a separate mixing operation, being incorporated into the mix after the other ingredients have been chopped, ground, or rolled and blended together. Although costs of mixing molasses into a feed were not ascertained in the survey, several feed-mill operators pointed out that molasses mixing required additional handling and power at the mill, as well as investment in mixing equipment.

Use of molasses to improve the digestibility and palatability of cheaper, low-quality roughages for ruminants offers a market opportunity wherein the molasses is not a direct substitute for other carbohydrate feed ingredients. Measuring the competitive position of molasses for this use is complicated; the feed value of the roughage is enhanced by improved digestibility and also a greater quantity of the roughage is eaten because of improved palatability. Molasses seems to have its greatest value to the livestock feeder in this application and also its greatest market opportunity.

Its market opportunity in the form of dried molasses products in feed mixing is limited by its cost relative to other carbohydrate sources. Feed mixers interviewed who had used a dried product reported that the price was too high in relation to liquid molasses or to feed grains. Some indicated that they believed that raw sugar would be used in preference to dried molasses

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8/ A companion study delves more fully into the transportation and distribution situation for molasses: Poats, F. J. Transportation in Marketing Molasses for Feed. U. S. Dept. Agr. Mktg. Res. Rept. 149, 23 pp., illus. September 1956.

products if liquid molasses were not available. They reported that raw sugar would be cheaper, on the basis of carbohydrate content, than their possible sources of dried molasses products.

SUGAR IN MIXED FEEDS

Raw sugar as a potential carbohydrate ingredient in feeds in competition with the grains merits attention. The possibilities for such utilization of sugar have attracted attention since World War II. During 1954 and 1955 world prices for sugar were low enough to attract some buyer interest, and the possibility for marketing the oversupply of Cuban sugar, left from year to year in the form of standing sugarcane, has attracted producer interests. The lowest world market price of raw sugar, however, has been more than twice the price paid for the sugar content of liquid molasses.

As a feed ingredient, sugar would contribute carbohydrates in a concentrated, readily assimilable form. It would lack the moistness, odor, and mild laxative effect of feeds containing molasses.

Raw sugar for feed must bear the full cost of production; whereas molasses is a byproduct, the cost of which--if it has no market--must be charged to the making of sugar.

The question of using sugar in mixed feeds was regarded by members of the feed industry as mostly a matter of price. If sugar could be obtained at a price competitive with other carbohydrates, its use could be greatly increased. Problems of handling, storing, and mixing, if any, were considered minor. At present, sugar used in mixed feeds is limited mostly to feeds for special purposes, such as pig and calf starter and feeds for baby chicks. The most frequently mentioned use was as coating for pelleted feeds in these categories.

In calendar year 1955, the first year a significant quantity of sugar was used in feeds, 18,990 tons of raw sugar (96° polarization) were imported into the United States for livestock feed preparations. This volume was several times the quantity imported in 1954.

The cost of sugar for livestock feed can be analyzed in terms of the various component charges for a hundred pounds of raw sugar testing 96 sugar degrees. A typical situation in 1955 was:

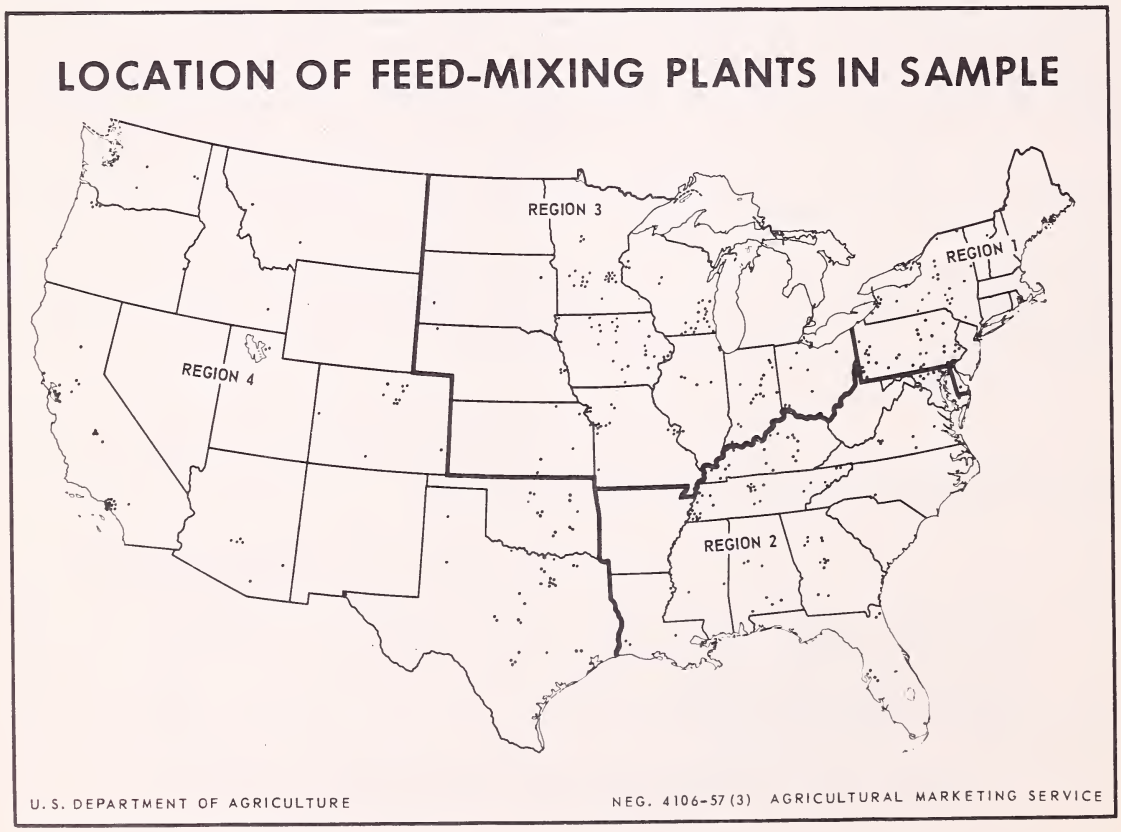
	Price per cwt.
World raw sugar f.a.s. Cuba	$3.25
Ocean freight and insurance to New Orleans	.40
Import duty, 96-degree sugar	.50
Import compensating tax	.50
Total cost, delivered port of New Orleans	$4.65

Handling charges at the port and barging, storing, and handling charges to upriver ports and feed mixing centers would add 1 dollar or more to this cost, making the price to users at feed mills over 5.5 cents per pound.

In 1955, a concerted effort by producers, labor groups, and processors of sugar in Cuba and the Dominican Republic to move surplus sugar through exports for livestock feed resulted in large shipments of sugar for feed use to the United States. Its price (f.a.s.) through cooperative efforts and special tax benefits was about $1 per cwt. under the world raw-sugar price. For identification and to prevent its diversion for human consumption, this sugar was dyed, usually green. A considerable portion of the 18,990 tons imported into the United States in 1955 was this special "surplus removal" sugar.

These conditions made the sugar price competitive on a sugar-content basis with dried molasses products. However, since the market for dried molasses products is composed mostly of small-volume users, and is seasonal in character on account of its use in making silage, the opportunity to market sugar in this form is not promising.

Provisions in the Internal Revenue Code for relief of import compensating tax when sugar is consumed as a feed lower these costs approximately 50 cents per hundredweight (depending upon the sugar degrees of the raw sugar imported). But handling and certification of sugar for feed use will add to the marketing cost and absorb some of the saving on taxes.



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